

6:20-cv-00348

EXHIBIT B

PRELIMINARY CLAIM CHART (Subject to supplementation and amendment based on acquisition of further information)

Pat. 6,819,539	Verizon's Sale of the Motorola Moto Z3 ("The Accused Instrumentalities")
8. An apparatus comprising: a detection circuit configured to generate a signal having on event condition; and	The accused product utilizes an apparatus comprising: a detection circuit (e.g., a battery monitoring circuit) configured to generate a signal (e.g., voltage or current notification) having on event condition (e.g., if state is high or low). As shown below, the Motorola Moto Z3 utilizes a Qualcomm Snapdragon 835 processor.

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	<p data-bbox="458 629 687 677">verizon</p> <p data-bbox="719 629 1078 677">Wireless In Home Business Phones Plans Deals Shop Support 5G</p> <p data-bbox="1188 629 1367 677">Stores    Español Sign in</p> <p data-bbox="453 762 801 789">Features Specs Reviews FAQs Accessories</p> <p data-bbox="1225 762 1312 789">Chat</p> <p data-bbox="453 832 633 853">Home / Smartphones / Motorola</p> <h2 data-bbox="453 853 698 882">Motorola moto z³</h2> <p data-bbox="453 903 621 929">★★★☆☆ (286 Reviews)</p> <p data-bbox="453 931 703 956">No longer available for purchase.</p> <p data-bbox="453 967 915 1028">Accelerate your mobile experience with the moto z³, the world's first smartphone that can be upgraded to 5G using moto mods.¹ Talk, text and chat for See More</p> <hr/> <p data-bbox="496 1106 621 1129">Device Support</p> <p data-bbox="703 1106 855 1129">Trade-in my device</p> <p data-bbox="453 1163 703 1186">Shop the latest Motorola devices</p>  <p data-bbox="1192 1199 1323 1222">Chat with us</p> <p data-bbox="439 1235 1073 1262">https://www.verizon.com/smartphones/moto-z3/#specsHeading</p>

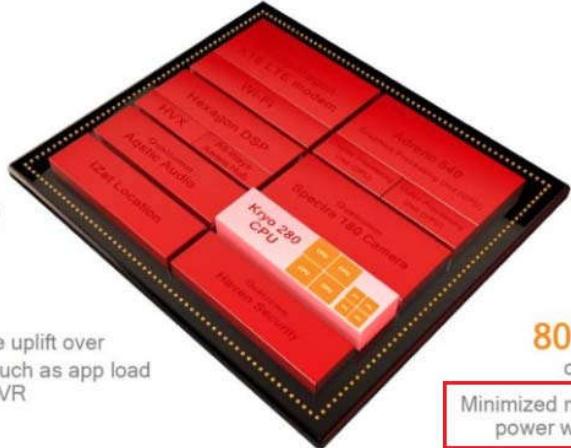
Pat. 6,819,539		Verizon's Sale of the Motorola Moto Z3 ("The Accused Instrumentalities")
	Colors	Ceramic Black
	SAR	Head 1.11W/kg Body 1.18 W/kg
	Hearing Aid Compatibility	M3/T4
	Network	4G LTE (B2, 4, 5, 7, 13, 20, 28, 66) CDMA: (BC0, 1) GSM/GPRS/EDGE (B2, 3, 5, 8 MHz) UMTS/HSPA+ (B1, 2, 5, 8)
	Processor	Octa-core 2.35 GHz, Qualcomm® Snapdragon™ 835
	HD Voice with Video Calling	Y
Compare devices		
<hr/>		
Motorola moto z³ Support		
<p>Verizon Wireless Support helps you better understand your Verizon mobile device and other Verizon services. Motorola moto z³ Support</p> <p>https://www.verizon.com/smartphones/moto-z3/#specsHeading</p>		

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	<p>As shown below, the Snapdragon 835 includes a battery monitoring circuit that generates a signal based upon the occurrence of a certain condition (in this case voltage variances for normal values).</p> <p> Snapdragon 835 Mobile Platform</p> <p>https://www.qualcomm.com/products/snapdragon-835-mobile-platform</p>

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	<p>Snapdragon 835 mobile platform advancements:</p> <ul style="list-style-type: none"> • Snapdragon X16 LTE modem: mobile connectivity with LTE download speeds up to 1 Gbps, multi-gigabit 802.11ad, and integrated 2x2 802.11ac Wi-Fi with MU-MIMO • Qualcomm® Quick Charge™ 4 technology: 20% faster, 30% more efficient than our previous generation, charge from zero to up to 50% in 15 minutes¹ • Qualcomm® Adreno™ 540 GPU with visual processing subsystem: Advanced 3-D graphics rendering and up to 60X more colors help deliver life-like visuals for immersive experiences² • Qualcomm Spectra™ 180 Camera ISP: Dual 14-bit ISP's support up to 32MP single or dual 16MP cameras for the ultimate photography and videography experience • Qualcomm Hexagon™ 682 DSP: Support for latest Machine Learning frameworks and image processing. Includes Hexagon Vector eXtensions and Qualcomm All-Ways Aware™ technology utilizing connectivity and sensors <p>https://www.qualcomm.com/media/documents/files/snapdragon-835-mobile-platform-product-brief.pdf</p>

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	<pre>5006. qcom,bcl { 5007. compatible = "qcom,bcl"; 5008. qcom,bcl-enable; 5009. qcom,bcl-framework-interface; 5010. qcom,bcl-freq-control-list = <0x1a 0x1b 0x1c 0x1d>; 5011. qcom,bcl-hotplug-list = <0x1a 0x1b 0x1c 0x1d>; 5012. qcom,bcl-soc-hotplug-list = <0x1a 0x1b 0x1c 0x1d>; 5013. 5014. qcom,ibat-monitor { 5015. qcom,low-threshold-uamp = <0x33e140>; 5016. qcom,high-threshold-uamp = <0x401640>; 5017. qcom,mitigation-freq-khz = <0x8ca00>; 5018. qcom,vph-high-threshold-uv = <0x3567e0>; 5019. qcom,vph-low-threshold-uv = <0x325aa0>; 5020. qcom,soc-low-threshold = <0xa>; 5021. qcom,thermal-handle = <0xa0>; 5022. }; 5023. };</pre> <p>https://pastebin.com/U0i7nP4P</p>

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	<pre> 564 bcl->btm_vph_adc_param.btm_ctx = bcl; 565 bcl->btm_vph_adc_param.threshold_notification = bcl_vph_notification; 566 bcl->btm_vph_adc_param.channel = bcl->btm_vph_chan; 1381 bcl->btm_ibat_adc_param.btm_ctx = bcl; 1382 bcl->btm_ibat_adc_param.threshold_notification = bcl_ibat_notification; 1383 bcl->btm_ibat_adc_param.channel = bcl->btm_ibat_chan; 536 static void bcl_ibat_notification(enum qppnp_tm_state state, void *ctx); 537 static void bcl_vph_notification(enum qppnp_tm_state state, void *ctx); </pre> <p style="text-align: center;">Reports a volatage value</p> <p style="text-align: center;">Reports a current value</p> <p>https://android.googlesource.com/kernel/msm/+/refs/heads/android-msm-angler-3.10-nougat/drivers/power/battery_current_limit.c</p> <pre> 707 enum qppnp_tm_state { 708 ADC_TM_HIGH_STATE = 0, 709 ADC_TM_COOL_STATE = ADC_TM_HIGH_STATE, 710 ADC_TM_LOW_STATE, 711 ADC_TM_WARM_STATE = ADC_TM_LOW_STATE, 712 ADC_TM_STATE_NUM, 713 }; </pre> <p>https://android.googlesource.com/kernel/msm/+/refs/heads/android-msm-asus-3.10-nougat-mrl-wear-release/include/linux/qppnp/qppnp-adc.h</p>
a storage circuit configured to store said event;	The accused product comprises a storage circuit (e.g., L2 cache) configured to store said event (e.g., if state is high or low). As shown below, the Snapdragon 835 includes an L2 cache that stores voltage variance events.

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	 <p>Performance</p> <p>Up to 2.45GHz 2MB L2</p> <p>20% performance uplift over range of use cases such as app load time, web browsing, VR</p> <p>Efficiency</p> <p>1.8GHz 1MB L2</p> <p>80% of time is spent on efficiency cluster</p> <p>Minimized memory transaction power with larger L2 cache</p> <p>https://www.androidauthority.com/qualcomm-details-snapdragon-835-735688/</p>
a table configured to store a plurality of event types; and	<p>The accused product comprises a table (e.g., a table containing various thresholds) configured to store a plurality of event types (e.g., if state is high or low).</p> <p>As shown in the code below, the Snapdragon 835 utilizes a table that defines various voltage conditions and their corresponding thresholds.</p>

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	<pre> 5006. qcom,bcl { 5007. compatible = "qcom,bcl"; 5008. qcom,bcl-enable; 5009. qcom,bcl-framework-interface; 5010. qcom,bcl-freq-control-list = <0x1a 0x1b 0x1c 0x1d>; 5011. qcom,bcl-hotplug-list = <0x1a 0x1b 0x1c 0x1d>; 5012. qcom,bcl-soc-hotplug-list = <0x1a 0x1b 0x1c 0x1d>; 5013. 5014. qcom,ibat-monitor {qcom,ibat-monitor 5015. qcom,low-threshold-uamp = <0x33e140>; 5016. qcom,high-threshold-uamp = <0x401640>; 5017. qcom,mitigation-freq-khz = <0x8ca00>; 5018. qcom,vph-high-threshold-uv = <0x3567e0>; 5019. qcom,vph-low-threshold-uv = <0x325aa0>; 5020. qcom,soc-low-threshold = <0xa>; 5021. qcom,thermal-handle = <0xa0>; 5022. }; 5023. }; </pre> <p>https://pastebin.com/U0i7nP4P</p>

Pat. 6,819,539	Verizon's Sale of the Motorola Moto Z3 ("The Accused Instrumentalities")
	<pre> 5014. qcom,ibat-monitor { 5015. qcom,low-threshold-uamp = <0x33e140>; 5016. qcom,high-threshold-uamp = <0x401640>; 5017. qcom,mitigation-freq-khz = <0x8ca00>; 5018. qcom,vph-high-threshold-uv = <0x3567e0>; 5019. qcom,vph-low-threshold-uv = <0x325aa0>; 5020. qcom,soc-low-threshold = <0xa>; 5021. qcom,thermal-handle = <0xa0>; 5022. }; 5023. }; ---</pre> <p>https://pastebin.com/U0i7nP4P</p>
a circuit configured to (i) reset when said event condition is a first predetermined type and (ii) implement recover action when said event condition is a second predetermined type, wherein said first and second predetermined types are determined in response to a comparison of said event to said plurality of event types stored in said table.	The accused product comprises a circuit (e.g., resource power manager circuit) configured to (i) reset (e.g., <code>cpu_down</code>) when said event condition is a first predetermined type (e.g., when <code>bcl_soc_state == BCL_LOW_THRESHOLD OR bcl_vph_state == BCL_LOW_THRESHOLD</code>) and (ii) implement recover action (e.g., <code>cpu_up</code>) when said event condition is a second predetermined type (e.g., when <code>bcl_soc_state is not equal to BCL_LOW_THRESHOLD, bcl_vph_state is not equal to BCL_LOW_THRESHOLD and bcl_ibat_state is not equal to BCL_HIGH_THRESHOLD</code>), wherein said first and second predetermined types are determined in response to a comparison of said event to said plurality of event types stored in said table (e.g. the comparison of collected values with stored thresholds).

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	<p>4 Resource Power Manager (RPM)</p> <p>5</p> <p>6 RPM is a dedicated hardware engine for managing shared SoC resources, 7 which includes buses, clocks, power rails, etc. The goal of RPM is 8 to achieve the maximum power savings while satisfying the SoC's 9 operational and performance requirements. RPM accepts resource 10 requests from multiple RPM masters. It arbitrates and aggregates the 11 requests, and configures the shared resources. The RPM masters are 12 the application processor, the modem processor, as well as some 13 hardware accelerators.</p> <p>https://android.googlesource.com/kernel/msm/+/android-7.1.0_r0.2/Documentation/arm/msm/rpm.txt</p> <p>https://www.slideshare.net/linaroorg/lcu14-210-qualcomm-snapdragon-power-management-unique-challenges-for-power-frameworks</p>

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	<pre> 213 #ifdef CONFIG_SMP 214 static void __ref bcl_handle_hotplug(struct work_struct *work) 215 { 216 int ret = 0, _cpu = 0; 217 218 mutex_lock(&bcl_hotplug_mutex); 219 if (cpumask_empty(bcl_cpu_online_mask)) 220 bcl_update_online_mask(); 221 222 if (bcl_soc_state == BCL_LOW_THRESHOLD 223 bcl_vph_state == BCL_LOW_THRESHOLD) 224 bcl_hotplug_request = bcl_soc_hotplug_mask; 225 else if (bcl_ibat_state == BCL_HIGH_THRESHOLD) 226 bcl_hotplug_request = bcl_hotplug_mask; 227 else 228 bcl_hotplug_request = 0; 229 230 for_each_possible_cpu(_cpu) { 231 if (!(bcl_hotplug_mask & BIT(_cpu)) 232 && !(bcl_soc_hotplug_mask & BIT(_cpu))) 233 !(cpumask_test_cpu(_cpu, bcl_cpu_online_mask))) 234 continue; 235 236 if (bcl_hotplug_request & BIT(_cpu)) { 237 if (!cpu_online(_cpu)) 238 continue; 239 ret = cpu_down(_cpu); -> Reset 240 if (ret) </pre> <p style="text-align: right;">Event condition is a first predetermined type</p> <p>https://android.googlesource.com/kernel/msm/+refs/heads/android-msm-angler-3.10-nougat/drivers/power/battery_current_limit.c</p>

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	<pre> 214 static void __ref bcl_handle_hotplug(struct work_struct *work) 215 { 216 int ret = 0; _cpu = 0; 217 218 mutex_lock(&bcl_hotplug_mutex); 219 if (cpumask_empty(bcl_cpu_online_mask)) 220 bcl_update_online_mask(); 221 222 if (bcl_soc_state == BCL_LOW_THRESHOLD 223 bcl_vph_state == BCL_LOW_THRESHOLD) 224 bcl_hotplug_request = bcl_soc_hotplug_mask; 225 else if (bcl_ibat_state == BCL_HIGH_THRESHOLD) 226 bcl_hotplug_request = bcl_hotplug_mask; 227 else 228 bcl_hotplug_request = 0; Event condition is a second predetermined type 229 230 for_each_possible_cpu(_cpu) { 231 if (!(bcl_hotplug_mask & BIT(_cpu)) 232 && !(bcl_soc_hotplug_mask & BIT(_cpu)) 233 !(cpumask_test_cpu(_cpu, bcl_cpu_online_mask))) 234 continue; 235 236 if (bcl_hotplug_request & BIT(_cpu)) { 237 if (!cpu_online(_cpu)) 238 continue; 239 ret = cpu_down(_cpu); 240 if (ret) 241 pr_err("Error %d offline core %d\n", 242 ret, _cpu); 243 else 244 pr_debug("Set Offline CPU:%d\n", _cpu); 245 } else { 246 if (cpu_online(_cpu)) 247 continue; 248 ret = cpu_up(_cpu); Event condition is a second predetermined type 249 if (ret) Recover </pre> <p>https://android.googlesource.com/kernel/msm/+refs/heads/android-msm-angler-3.10-nougat/drivers/power/battery_current_limit.c</p>

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	<pre> 5014. qcom,ibat-monitor { 5015. qcom,low-threshold-uamp = <0x33e140>; 5016. qcom,high-threshold-uamp = <0x401640>; 5017. qcom,mitigation-freq-khz = <0x8ca00>; 5018. qcom,vph-high-threshold-uv = <0x3567e0>; 5019. qcom,vph-low-threshold-uv = <0x325aa0>; 5020. qcom,soc-low-threshold = <0xa>; 5021. qcom,thermal-handle = <0xa0>; 5022. }; 5023. }; </pre> <p>https://pastebin.com/U0i7nP4P</p> <p>Threshold Values from the table (dtsi) are imported into the battery_current_limit module thru a record data type (bcl).</p>

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	<pre> 1519 1520 BCL_FETCH_DT_U32(ibat_node, key, "qcom,low-threshold-uamp", ret, 1521 bcl->ibat_low_thresh.trip_value, ibat_probe_exit); 1522 BCL_FETCH_DT_U32(ibat_node, key, "qcom,high-threshold-uamp", ret, 1523 bcl->ibat_high_thresh.trip_value, ibat_probe_exit); 1524 BCL_FETCH_DT_U32(ibat_node, key, "qcom,mitigation-freq-khz", ret, 1525 bcl->bcl_p_freq_max, ibat_probe_exit); 1526 BCL_FETCH_DT_U32(ibat_node, key, "qcom,vph-high-threshold-uv", ret, 1527 bcl->vbat_high_thresh.trip_value, ibat_probe_exit); 1528 BCL_FETCH_DT_U32(ibat_node, key, "qcom,vph-low-threshold-uv", ret, 1529 bcl->vbat_low_thresh.trip_value, ibat_probe_exit); 1530 BCL_FETCH_DT_U32(ibat_node, key, "qcom,soc-low-threshold", ret, 1531 soc_low_threshold, ibat_probe_exit); </pre> <p>The values of the table are now inside the record, bcl. The State of Charge low threshold is saved in a variable soc_low_threshold.</p> <pre> 174 /* BCL Peripheral monitor parameters */ 175 struct bcl_threshold ibat_high_thresh; 176 struct bcl_threshold ibat_low_thresh; 177 struct bcl_threshold vbat_high_thresh; 178 struct bcl_threshold vbat_low_thresh; 179 uint32_t bcl_p_freq_max; 180 }; </pre> <p style="text-align: center;">Different possible event types</p> <p>https://android.googlesource.com/kernel/msm/+/refs/heads/android-msm-angler-3.10-nougat/drivers/power/battery_current_limit.c</p>

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	<pre>17 #define BCL_NAME_MAX_LEN 20 18 19 enum bcl_trip_type { 20 BCL_HIGH_TRIP, 21 BCL_LOW_TRIP, 22 BCL_TRIP_MAX, 23 };</pre> <p>https://android.googlesource.com/kernel/msm/+/refs/heads/android-msm-angler-3.10-nougat/include/linux/msm_bcl.h</p> <pre>31 struct bcl_threshold { 32 int trip_value; 33 enum bcl_trip_type type; 34 void *trip_data; 35 void (*trip_notify) (enum bcl_trip_type, int, void *);</pre>

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	<pre> 214 static void __ref bcl_handle_hotplug(struct work_struct *work) 215 { 216 int ret = 0, _cpu = 0; 217 218 mutex_lock(&bcl_hotplug_mutex); 219 if (cpumask_empty(bcl_cpu_online_mask)) 220 bcl_update_online_mask(); 221 222 if ((bcl_soc_state == BCL_LOW_THRESHOLD 223 bcl_vph_state == BCL_LOW_THRESHOLD) 224 bcl_hotplug_request = bcl_soc_hotplug_mask; → First event 225 else if (bcl_ibat_state == BCL_HIGH_THRESHOLD) 226 bcl_hotplug_request = bcl_hotplug_mask; 227 else → Second event 228 bcl_hotplug_request = 0; 229 230 for_each_possible_cpu(_cpu) { 231 if (((!bcl_hotplug_mask & BIT(_cpu)) 232 && !(bcl_soc_hotplug_mask & BIT(_cpu))) 233 !(cpumask_test_cpu(_cpu, bcl_cpu_online_mask))) 234 continue; 235 236 if (bcl_hotplug_request & BIT(_cpu)) { 237 if (!cpu_online(_cpu)) 238 continue; 239 ret = cpu_down(_cpu); https://android.googlesource.com/kernel/msm/+refs/heads/android-msm-angler-3.10-nougat/drivers/power/battery_current_limit.c </pre> <p>The new values of bcl_vph_state and bcl_ibat_state are compared against the threshold values from the table.</p>

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